10: d'Orleans--368-369 T-3 (1891-92) 1894 Laos
116, 249, 314, 513

[LSS: in the village of Muong Liep (Diap)] "In front of the huts pods gathered from the trees are drying, full of seeds which are surrounded by a silky down like those of some of our poplars. It is known as nghioue, and it is used here for pillows and mattresses.

I note, also, on the dryers, tobacco in shreds. [369] This plant grows well here, and one sees it everywhere about the villages, rank as weeds."

23: Franck--289-290 T-2 (1924) 1926 Laotians-1-2
116, 291, 286, 314, 515

"The women were usually the first to see us, for they were constantly bathing themselves and their naked urchins in the stream, and they were clever at getting into or out of their barrel-like single garment without unduly exposing themselves. I saw more bathing on that journey down the Nam-khan than during my two years in China, and less uncleanliness in all Laos than in the smallest Chinese village. The women of Luang Prabang, especially along the rivers, are no burden to their fathers and husbands so far as clothing is concerned. In every village we visited they were naked to the waist, and did not know it; at least [290] they did not seem to be conscious that in other, often less modest lands, such a costume might be frowned upon. They wore a single piece of cloth, spun from cotton grown on the spot, and woven on hand-looms under their long-legged houses. Colored in the thread with dyes made from nuts and vegetable growths of the region, this strip is simply wrapped about the waist. Or, in the case of a few of the youngest, which in that backward land still means the more modest women, the unmarried perhaps, or at least those who had not yet borne a child, it is wrapped about the lower two thirds of the breasts, with correspondingly more of the legs showing. Thus one recognized the girls of flapper age by their shapely brown legs and the matrons by their resemblance in costume to the Venus of Milo. Once a child has arrived, the exposure incident to suckling it seems to overcome virginal modesty, or in the absence of offspring pride no doubt soon joins carelessness in casting

out the habits of maidenhood, so that there were displayed the scrawny pendent udders of the sterile as well as the withered rags of old age. The sight of a white man appeared to move some of the women to cover their breasts, a mere matter of deftly raising the garment. Whether this gesture was a recognition of the susceptibility of the French--who surely could not have issued non-exposure decrees!--or a mere matter of politeness, like the male squat, there was no means of knowing."

68: Mouhot--134-135 N-5 (1858-61) 1864 Laotians
116, 439, 314

"Little commerce is carried on in this part of Laos. [HD: i.e. in the territory between Loeui and Pak Lai] The Chinese inhabiting Siam do not come as far, owing to the enormous expense of transporting all their merchandise on elephants. Nearly every year a caravan arrives from Yunnan and Quangsee, composed of about [135] a hundred persons and several hundred mules. Some go to Kenne Thao, others to M. Nâne and Chieng Maï. They arrive in February, and leave in March or April.

The mulberry does not thrive in these mountains; but in some localities this tree is cultivated for the sake of furnishing food to a particular insect which lives upon its leaves, and from which is obtained the lague or Chinese varnish.

All the gum-benzoin which is sold at Bangkok comes from the northern extremity of the state of Louang Prabang, and from a district tributary both to Cochin China and Siam, and peopled rather by Tonquinites than Laotians."

Se-Bang-Fai. But studies are not yet sufficiently advanced for us to be able to give any useful information. 316

We have nevertheless felt that we should mention these deposits, in order to establish the importance of all this part of Laos from the point of view of mineral wealth.

[327] [Illustration at top of page]

CHAPTER VII

I

SCAVENGING

We have seen that the inhabitants of Laos are apathetic and little inclined to work. They nevertheless find, although they go to scarcely any trouble, enough to supply their needs easily. 461 241

Indeed, with the exception of a few annual crops such as tobacco, cotton and indigo which are grown on the ever-renewed alluvia of the watercourses, the production of rice and of maize are the only occupations which require--and even then during a relatively short time--any degree of work or perseverance. We may mention the opium poppy, ramie, hemp and the mulberry tree merely as a reminder, for only a small part of the population devotes its time to these crops, which are still not at all extensive. [249]

Yet, it may be objected, the native has an easy life, dresses adequately, [328] lives in a house which is solid and comfortable from his point of view, has various tools and utensils, weapons, and sometimes even valuable cloth goods, jewels, etc. He spends money for celebrations and for offerings to the bonzes and pagodas. He pays taxes, he supports court costs which are often large with respect to the question at issue, and he is subject to the exactions of his mandarins to a greater or less degree. Finally, the commercial transactions of Laos involve quantities and sums which are quite high in comparison to the sparse population. 511 [438]

How are we to reconcile all these factors, and how is it that the Laotian, who produces so little with his labor, nevertheless has all he needs to get along on?

This is due to the fact that Laos is above all else a scavenging country. 314

Indeed scavenging, that is to say the gathering of forest products, hunting and fishing, is all that is needed besides rice and maize to supply the day to day needs of the native and even provide him with a comparatively important basis for trade.

Forest Products

1. Benzoin (Khab-Niane).

Benzoin is extracted from the tree called Styrax benzoin, by means of incisions made on the trunk. The benzoin trees (Kok-Khab-Niane) are localized in Upper Tran-Ninh, the south of the Hua-Pahn and the north of the province of Luang-Prabang. They are not cultivated in any way. The resin or gum is harvested at certain times of the year, generally by the Khas, at the foot of the trees and along the trunk, where it coagulates in masses or tears.

Benzoin is collected in its natural state, that is to say in tears of various sizes and in breakages. In the production centers it is separated into three grades: large and medium tears, medium and small tears, and small pieces and breakages. In the transit markets these three grades are sorted and screened and once more divided into six kinds or types, which are: large tears, medium tears, small tears, mixed large, mixed medium, and finally tiny fragments and dust.

A few years ago a chemical process was [329] discovered, it would seem, for extracting certain of the aromatic alkaloids contained in benzoin from coal, and the market value of this product suddenly dropped by more than sixty percent. At the present time, depending on the grade, the market price in Luang-Prabang is from 90 to 115 francs per hundred kilograms (1), in Nong-Khay from 100 to 135

(1) We have deemed it preferable to give the price in francs and per hundred kilograms, since the reader may not be familiar with Laotian weights and currency.

francs, and in Korat from 120 to 160 francs.

Part of the benzoin production is consumed locally in the manufacture of sticks of incense for use in worship. All the rest is exported to Bangkok and from there to Europe. A very small proportion is sent to Tonkin by way of the Black River. Upon its arrival in Bangkok, benzoin from Laos is worth twice as much as in Luang-Prabang.

2. Crimson lake or stick-lac (Khang-Deng).

This gum is produced by an insect of the "cochineal" type, the

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Coccus lacca, which secretes the lac to envelop its larvae.

In trade it appears in the form of half-cylindrical fragments, in breakages (seed-lac), or else adhering to the branches of the tree on which it formed. The latter is lac on sticks, whence the English name stick-lac by which it is known in Far Eastern trading circles (2).

(2) Lac in its most widespread form--lac in shells (shellac)--is not found in Laos. It can easily be produced by boiling the preceding types in alkaline water.

This product is harvested by scavenging from trees which were seeded long ago and are scattered throughout the brush, and also by regular cultivation from a triennial tree, as will be seen below. The principal varieties of trees on which lac is found are the Ficus, the butées, the Croton, the Mimosa and the Acacia.

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There are three kinds of lac: bright-colored lac (which colors a moistened finger) in whole pieces, lac on wood and brown cellular lac in more or less broken fragments. Throughout the country, however, it is sold mixed, and only at the transit markets are the three kinds separated.

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[330] The price per hundred kilograms is from 35 to 42 francs at Luang-Prabang, from 45 to 48 francs at Pak-Lay, from 47 to 50 francs at Nong-Khay, 42 francs at Khong and Bassac, 62 francs at Pnom-Penh and Cholen, and from 72 to 85 francs at Korat.

Crimson lake is used for dyeing as well as in the preparation of certain colors and varnishes with an alcohol base. A small proportion remains in the country, but the greater part is exported.

3. Cardamom (Mak-Neng).

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Cardamom is the fruit of the plant Elateria cardamomum which grows in the forests but which may be cultivated, as is the case on the plateau of the Bolovens in Laos and in the region of Pursat in Cambodia. The variety common to all parts of Laos is the great cardamom or bastard cardamom, while that cultivated in Cambodia is the true cardamom or small cardamom, much superior to the first in quality and value.

The plant grows best in the humid forests, and is harvested in August or September. The plant has vast numbers of light seeds, and it takes about eighty or a hundred thousand seeds to make up the weight of one "mune" (about twelve kilograms). The price per

[435] The price per hundred kilograms is from 50 to 54 francs in Luang-Prabang, 62 francs in Pak-Lay, from 62 to 70 francs in Nong-Khay, 50 francs in Cammon, from 75 to 83 francs in Song-Khone, from 66 to 87 francs in Saravane, from 70 to 83 francs in Bassac, from 88 to 95 francs in Khong, 58 francs in Attopeu, from 50 to 83 francs in Stung-Treng, 133 francs in Pnom-Penh, 140 francs in Cholen (1) and from 80 to 120 francs in

(1) At this market cardamom from Pursat brings from 625 to 830 francs per hundred kilograms.

Korat.

4. Cinnamon (Cinnamomum zeylanicum. Kai-Hom in Laotian).

The cinnamon tree must have been cultivated at one time in the territory of Vien-Tiane. Then the inhabitants were driven out as a result of foreign incursions and abandoned their gardens, which were gradually invaded by brush. The harvesting of cinnamon has since become a scavenging operation without any form of cultivation. For several years now, doubtless in consequence of the many requests which were made when the Customs service tried to establish a monopoly of this product in Annam, [331] [Illustration] [332] [Blank page] [333] the inhabitants have once more begun to maintain the cinnamon trees and to give them some attention. Plantations have even been started, and this propitious initiative should be encouraged.

5. Indigo (Kok-Kam and Kok-Hom, depending on whether the Indigofera tinctoria or the Indigofera anil is designated).

These two plants are not always scavenging products, since the greater part of Laotian indigo comes from crops grown on the banks of the Mekong and its chief tributaries.

There is also an indigo-bearing liana which grows wild. The Laotians call this "Bouok-Khua".

In Laos the preparation of indigo is extremely simple. The fresh leaves and stalks of the different varieties of indigo plants are put to soak in wooden vats containing water and an acid element, usually the acid of lemons or limes. After a certain time the leaves are removed, then lime is precipitated in the water and the mixture is violently stirred. The lime fixes the dye and is deposited at the bottom of the vats, which are exposed to the air. When the clear water which rises to the surface has been completely evaporated, a hardened mass which is the indigo is left at the bottom of the vat. This product is not exported, but serves only for local consumption. Its price varies between 12 and 15 francs per hundred kilograms.

Its price varies between 12 and 15 francs per hundred kilograms. 000

6. Catechu (Sisiet). 824

Catechu is produced from a decoction of the bark of two varieties 314
of trees, the catechu acacia and the leafy butée. 276

This product, which is used in making the national masticatory together with betel, betel nuts and lime, is consumed, in the large centers of Upper Laos, in the form of a dry residue obtained from a decoction of the bark. Generally, however, it is the bark itself which is consumed after it has been broken up into small pieces.

Natural sisiet takes the form of shreds of bark about a cubit (.45 meter) long by four centimeters wide and one centimeter thick. The shreds are tied together in packs of twenty-five or fifty, depending on the region.

The whole production is consumed locally. The natives [334] [438]
go into the forest at points where suitable trees are to be found, bundle up the pieces and load thm on great rafts which go down from Pak-Lay and Vien-Tiane to Bassac and even to Khong.

At Pak-Lay sisiet is worth only 7 francs and 50 centimes per [435]
hundred pieces, but it naturally costs more the further away one goes from the centers of production.

7. Curcuma (Khi-Mine). 824

This plant, of the Zingiberaceae family, has a rhizome which 314
contains an orange-yellow coloring matter used for dyeing silk and 386
cotton.

Sometimes the inhabitants (chiefly the women and children) 302
rub their whole body with curcuma scrapings after a bath. The application of curcuma to the wet skin, which acquires a light yellow color, is said by the natives to ward off mosquitoes and keep the skin fresh.

Up to the present time this product has not formed the basis of [438]
any foreign trade. It is sold in small amounts on the markets of Laos.

8. Ginger. 263

The ginger which is called "Mak-Khing" in Laotian is the Zingi- 824
ber officinale or gray ginger. Used as a condiment by the entire 314
population, this product does not enter into trade. Its price varies [435]
between 12 francs and fifty centimes and 16 francs and fifty centimes per hundred kilograms.

9. Roucou. 824

The roucou, or fruit of the Roucouyer Bixia, is called "Kene- 314
Mak-Soum-Phou" in Laotian. Literally, this means Seed of an 386
acidulous mountain fruit. It is used to make red and orange dyes

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314 when mixed with curcuma. The trees are found in the forest, and
386 sometimes in gardens.

10. Yams.

The yam is an edible tubercle of the Dioscorea family. It is
262 represented by two varieties, the white and the black, which are called
241 "Mane-Phuek-Khao" and "Mane-Phuek-Dam" in Laotian. These tubercles are the main standby when there is a scarcity of rice and [335] maize, but in ordinary times they are used only to supplement the usual diet.

11. Taro or cush-cush (Mane-Pa).

Taro is also a food plant of the Aroïdées caladiées genus (Caladium esculentum). Like the yam, it is one of the most useful edible tubercles in times of famine.

12. Medicinal plants.

824 Designated by the generic name "Ya" in Laotian, these plants
278 are represented by special types of orchids, roots, bark, berries, leaves and even pieces of wood of different kinds, the whole forming an assortment of medicaments.

[438] The Khas are the ones who collect these various products from the depths of the forests, and they trade them either to Chinese or to Laotians for money or other goods.

[435] Certain of these plants and barks are used by the Laotians while others, such as the leaves from orchid plants, for example, are purchased by Chinese merchants at prices which vary between 33 and 62 francs per hundred kilograms.

13. Cloves.

The clove tree (Caryophyllus aromaticus. Kane-Phou in Laotian) is quite scarce in Laos. Cloves are mixed with various ingredients in masticatories or are taken as medicine.

Cultivation of the clove tree ought to be developed in Laos because of the high value of its flowers which, when dried on the tree, constitute the cloves of commerce.

14. Beeswax (Phung).

222 Beeswax is much sought-after in Laos, where a great deal of it is
[231] consumed. It is a scavenging product par excellence since, except in the Sib-Song-Pahn-Na, the inhabitants do not practice apiculture and
314 are content to go into the forest and look for honeycombs in order to extract the wax. The latter is used for domestic needs and for worship
[438] ceremonies. It also forms the basis of quite an important trade.

314 The wax is not of uniform quality in Laos, but varies in color and texture depending on the region, the type of bees [336] which produce it, and also on the flowers on which the latter feed.

In this land there are hive hunters who have a rare skill and an extraordinary flair. They are able to find wild hives in the confusion of the forest foliage, in hollow trunks and in rocky crags where no one else could. The methods used to capture the swarms of bees and their hives differ little from those in use in Europe, and include noise, music and smoke.

[789] The Laotians claim that some bee hunters are able to get rid of the swarms of bees by attracting their queen by means of the sound of a kind of flageolet and by pronouncing certain cabalistic words.

435 The price of wax is quite high. A hundred kilograms cost 250 francs in Luang-Prabang, 219 francs in Nong-Khay, 290 francs in Cammon, 300 francs in Song-Khone and Saravane, 333 francs in Bassac, 208 francs in Attopeu, 312 francs in Stung-Treng, 500 francs in Korat, 250 francs in Pnom-Penh, and 300 francs in Cholen.

15. Rattan (Vai).

314 The rattan is a palm tree of the genus Calamus rudentum and
285 Calamus petraeus. There are several types in Laos, which are used in accordance with their particular qualities.

The rattan industry is still in its early stages. A few Kha tribes of southern Laos traffic in rattan and supply the needs of local consumption, either in the form of crude rattan delivered in bundles, or in the form of mats and baskets, at a price of five francs per thousand or about sixty kilograms. It is present in great abundance throughout the whole land, and in northern Laos is even used for trade with Siam, which produces little rattan.

It is to be hoped that among the samples sent from Laos to France there will be some good ones which can be used abroad in the manufacture of all the wickerwork and esparto articles whose consumption is constantly increasing. This would provide an appreciable source of revenue for the land.

16. Bamboo.

313 There are some twenty varieties of bamboo. All [337] [Illustration] [338] [Blank page] [339] except one of these grow wild, the exception being the golden bamboo (Mai-So-Kham), which is chiefly cultivated in the enclosures of pagodas.

The following description of the many uses of bamboo is taken from the interesting work by Mme. Massieu:

313 "There are several kinds of bamboo. The large bamboo which is used to make boxes and floats is called mai-hane. The mai-tot is the male bamboo, [340] strong and slender, with its joints closer together. When provided with an iron point it is used for poling boats along in the rivers. The mai-an is the female bamboo, hollower and lighter, from which raft coverings and partition mats are made. It is the kind used to make kelates" (1).

[113] (1) Revue des Deux Mondes. "A travers l'Indo-Chine. Le Haut Laos et le Mékong," by Mme Isabelle Massieu, August 1, 1900.

•314 17. Rubber.

824 Rubber is called "Niang-Niut" in Laotian, which means, literally, elastic gum.

There are several plant varieties in Laos which supply a latex which becomes elastic after coagulation. Certain types of the ficus family, doubtless of the elastica genus, yield rubber of comparatively good quality. The plants which produce the most latex and that of the best quality, however, are lianas whose scientific nature has not yet been settled.

More than ten different kinds of rubber lianas are known. The Laotians call these "Khua-Mak-Niang, Khua-Hai, Khua-Niut-Niai, Khua-Mak-Som, Khua-Mak-Katong-Katiou, Khua-Khao-Pong, Khua-Lam-Sai, Khua-Tang-Tong, Khua-Som-Lam, Khua-Mak-Ka-Khay, Khua-Mak-Khao-Ngoua," etc.

It is quite certain that these diverse names do not refer to as many species which are dissimilar from the botanical point of view, but are merely different local terms used at widely separated points in order to designate the same lianas. Without any concern for their chief virtue, which is to supply latex rubber, the Laotians have named them for their appearance, the shape or type of their fruit, etc.

It seems likely that the varieties which we have just enumerated may be reduced to seven and perhaps less. We shall not be able to tell for sure until we have examined the stalks, leaves, flowers and fruits of the various species in a laboratory. The liana which is most widespread in Laos is the one bearing the name Khua-Mak-Khao-Ngoua or liana with fruits like buffalo horns. It is also called Khua-Mak-Som or liana with acid fruits. The latex is collected twice [341] each year, once in June or July (rainy season), and again in October or November (dry season). The first harvest yields only second grade rubber which is black and sticky. The second crop, which is less

314 plentiful by half than the first, yields a clear, sinewy, dry and elastic
824 rubber in threads and sheets.

Rubber from the second harvest has been submitted to competent individuals for examination, and it seems that it would bring a price of 8 to 10 francs per kilogram on the European market.

435 In April 1900 the purchase price of this product per hundred kilo-
314 grams was 137 francs in Vien-Tiane, from 166 to 208 francs in Muong-Son, 290 francs in Cho-Bo (Tonkin) and 550 francs in Vinh (Annam). Its resale price was 625 francs in Saigon, 700 francs in Singapore and from 800 to 1000 francs in Europe (1).

(1) This refers only to first grade rubber.

These figures suffice to show that Laotian rubber is a choice product in high demand, and a first-rate trade commodity holding the promise of sizeable profits.

439 The total amount of rubber exported from Laos in 1899 through
314 the ports of Tonkin, Annam and Cochinchina is estimated at some fifty tons. For 1900 the figure would appear to be about eight times larger (2). This trade has only developed in Laos in the last two or

(2) See Appendix XXII.

three years, but now that the initial impulse has been given and the people are beginning to harvest the latex which they used to scorn because there were no outlets for it, the traffic will not cease to increase from one year to the next, since rubber finds an increasing demand on the European market.

Although the lianas are extremely plentiful in the Laotian forests, care should now be taken to spare them as they are exploited and to increase the number of plants so as to avoid any shortages in the future.

314 18. Pine resin (Khi-Kok-Phek or Niang-Phek).

Pine resin is used in Laos only when mixed with crimson lake. It is used for making a varnish and certain mastic compounds. It has a very low value, never more than 20 francs per hundred kilograms and [342] sometimes as low as 6 francs. None of this product is exported. It would be easy to introduce the regular cultivation of pines and the harvesting of their resin into the land, if sufficiently remunerative outlets were opened up.

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19. Miscellaneous resins.

Several trees, such as the "Kok-Mai-Niang, Kok-Mai-Tabeng, [Illustration here] Kok-Mai-Sak" (1), etc., yield an oleo-resin which,

(1) See Appendix XX.

when mixed with paddy husks, is used to make torches and a siccative, shiny extract which is called "Nam-Mane-Niang," and again a kind of pitch (Khi-Si) which is used to caulk pirogues and to smear various basketwork receptacles so as to make them watertight. It is similar to damarine.

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The production of these resins is limited to local needs.

20. Black lacquer.

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The black lacquer of Laos is a natural black varnish, thick and [343] solid, which is called "Nam-Kieng." It is secreted by the "Kok-Mai-Nam-Kieng."

Nam-Kieng is used to lacquer racing pirogues, elephant palanquins, pagoda columns and statues, frames, receptacles of different kinds, sword sheaths, etc. The lacquer producing trees grow only in certain localities, and the varnish is not exported. Its price varies throughout the land between 62 and 75 francs per hundred kilograms.

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It would be of interest to identify this lacquer with that of Japan, and to study the question as to whether it might not be possible to increase the number of trees which produce it with a view towards making it the basis of an export trade, at least to the countries bordering on Laos.

21. Cunao (the mock gambier, Mak-Soua in Laotian).

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The cunao is a brownish tubercle used instead of catechu, the color of which it has, for dyeing cloth. It is found in Cammon, in a part of the Hua-Pahn and on the right bank of the Nam-Hou. This product is bought mainly by Annamites and Chinese, who use it in Annam and Tonkin for dyeing the peasants' work clothes.

near their silkworm breeding houses, but it is unfortunate that the new conditions in which the trees are placed should have an adverse effect on silk production. On the plateaus and in the high valleys, in the vicinity of land once occupied by villages, there are many mulberry trees which have continued to survive. They send out new leaves again even after the annual burnings of the forest clearings, and bear leaves which are vigorous and have a more pithy appearance than those of their fellows in the low, humid parts of the country. They are also said to be preferable for feeding silkworms (2).

(2) See Appendix XXIV.

Local consumption absorbs the greater part of the silk production, for the majority of Laotians, both men and women, use it in making the garments which they wear.

We do not possess exact data on the total production of silk in Laos. It has been estimated at about twenty tons annually. The price varies from 400 to 500 francs per hundred kilograms.

OPIUM POPPIES. The opium poppy is cultivated by the Yaos and the Meos, in northern Laos. Towards the end of the rainy season, [376] in September, the poppy seeds are sowed broadcast on land from which maize has just been harvested. Germination is activated by the last rains of the season and the plant flowers at the beginning of December. Harvesting is done shortly after the petals have fallen.

Closely spaced lengthwise incisions are made all along the surface of the capsule, allowing the plant juice to escape. It coagulates upon contact with the air and is collected daily until the plant has been completely exhausted (1).

(1) See Appendix XXV, report of M. Lussan, Cochinchina customs agent. The latter was sent on a mission to Upper Laos to experiment with growing opium poppies by less rudimentary methods than the ones in use among the Meos and the Yaos.

PAPER TREES. There are several trees in Laos whose bark is used to make paper. They seem to be of the mulberry type and are called "Kok-Sa."

The paper is made by hand on forms, by extremely rudimentary methods. Its manufacture occupies several villages of northern Laos.

316 healthy, and labor could be found quite easily. The route of access to the territory of Muong-Son would be through Tonkin, either by way of Cho-Bo-Van-Bu-Muong-Het or by way of Cho-Bo-Ta-Koa-Muong-Het. The journey from Hanoi to Muong-Son can be made in fifteen to eighteen days, as follows: two by steamship, eight by pirogue and the rest on horseback with bearers for the baggage.

(Extract from the reports by M. P. Macey.)

[131]

APPENDIX XXII
NOTES ON RUBBER
I

314 In Laos, the rubber lianas are known to the natives by the generic name Khua (1). According to the information which M.

[552] (1) In Laotian, khua is a generic term applied to all lianas and to all climbing plants without exception.

Leblévec, head of the Upper Mekong Hydrographic Mission, was so kind to furnish me upon my request, their number seems to be quite large.

This traveler classifies the rubber lianas of Upper Laos into two categories, according to the nature of the product which they yield.

The first category includes the Khua-ka-tong-ka-tiou, the Khua-sout-long and the Khua-som-lam. The elastic gum which these varieties produce is dark in color, either black or chestnut. The bark is pebbly and blackish-green in color. The leaves are shiny and dark green. The fruit is elongated and produces pilose, barbed seeds. Some of these lianas are as much as 30 to 40 centimeters in circumference. They are found in the forests of the Laotian plains, on the banks of the Mekong.

The Ka-tong-ka-tiou is said to be found nearly everywhere on very humid terrain covered with rushes which are burned in the rainy season. The Sout-long is found on the banks of the Ngoum, in the region of Tourakom. The Som-lam grows on the upper Nam-Sam and in Xieng-Khouang.

M. Leblévec classifies the lianas which yield a light brown or dark reddish rubber in the second category. These are the Khua-mac-ka-khay, the Khua-kao-pong, the Khua-lam-sai and the Khua-tang-tong.

314 The bark of these varieties is lighter in color, with green, gray and red spots. The leaves are a duller green and the fruits heavier and longer.

[132] These lianas belong to the highlands of Laos and to the thick mountain forests. The Mac-ka-khay is very plentiful in Borikan; the two following ones are found in the region of Van-Vien and the Tang-tong, which is quite rare, has been found in the interior on the right bank of the Mekong, as well as in Paksan.

In the absence of botanical specimens, we can only suppose that all these varieties belong, according to the indications given as to their fruits, to the Apocyneae family.

As for the samples of rubber which we have from these plants, some in balls and others in rolls of small dimensions, they all seem to have been obtained by the method of coagulating latex with heat in a receptacle of a certain size. The gum has remained sticky, and today, after having been kept for a year, all of it except one or two samples has become soft and viscous.

I am nevertheless persuaded that two or three of these lianas will yield rubber which is as good in quality as that of Nghe-An, provided that the crop is harvested in "tears" or in threads, this being the best system for avoiding the inclusion of putrescible serum.

Moreover, the rubber produced by these lianas already constitutes a noteworthy trade commodity in the Hua-Phans. M. Chaussé, one of our countrymen, has been making sizeable purchases of rubber there for several years, and comparatively large amounts of this product are said to be marketed in Cho-Bo at the rate of 45 piasters per picul, that is to say at more than two francs per kilogram.

[426] M. Delineau, whose commercial ventures in rubber in Tran-Ninh have also been brought to light, has bought wax and rubber there and tried to make the population accept loans which would be repayable in rubber.

314 But disadvantages are already arising in these regions--disadvantages
654 of which the cascarilleros, or seekers of cinchona trees, once set a bad example in Brazil. Since the elastic gum is coming more and more into demand in Upper Laos, in some places the natives have hacked and massacred the producing plants in order to obtain the coveted merchandise more easily and in larger quantities.

Since this habit shows a tendency to become widespread, in Muong-Son M. Montpeyrat has drawn up restrictive measures against these clumsy procedures. And in order at the same time to encourage cultivation of these plants which yield a desirable product, he has

314 established a seed-garden designed to supply the inhabitants with
654 cuttings and to teach them the most advantageous methods of exploitation.

314 I do not, however, believe that there is any need to fear the danger of the present barbarous method of exploitation, provided that it be carried out in a radical fashion. This estimate of the situation, which seems paradoxical, can be justified as follows. If the native fells the liana with a blow of his machete, it is best for him to cut it off at ground level. I assume that he will not be content merely with collecting the latex which flows out of the cutting [133] thus made, but that he will cut the liana into suitably small sections and collect the greater part of the latex which the whole length of the stalk contains at the time. This amount will certainly be greater than the amount which would flow out of an incision made so as not to compromise the life of the plant. What is more, new shoots will sprout from the foot of the felled liana, and it will then be a question of protecting them from too hasty a destruction so that after the required number of years there will be new plants which can be tapped. This amounts, so to speak, to exploitation of the rubber lianas by a radical pollard method. It would become profitable the day when the industry could obtain a constant output of rubber from the fresh or dried leaves, as is now done for gutta percha.

I believe, however, that exploitation by the method of regular and annual tappings of the adult plant is preferable by far. Felling would present really grave dangers only if it caused the felled plants to disappear and never to return.

We now have specimens of rubber from various regions of Upper and Lower Laos--from Vien-Tiane, Cam-Muon, Savanakhet, Ban-Mouang, Saravane, Song-Khone and Khong.

From the point of view of quality these specimens can be divided into two groups which, it would appear, are determined by two causes: their botanical origin and the way in which they are harvested.

The first group includes specimens in a compact, hand-kneaded ball the size of a billiard ball, or in twists from 10 to 15 centimeters long and 2 to 3 centimeters in diameter which are collected in bamboo tubes. These specimens are blackish, softer and less resilient, and occasionally contain hollow parts which are filled with a black pitch-like substance.

The second group includes specimens which are lighter in color, reddish and even whitish, dry and resilient. They are harvested in tears, thin strips or agglutinated threads, from which balls are made

• 314 which range from the size of a nut to the size of a billiard ball. These specimens are not sticky, do not deteriorate very much and are far superior to the preceding ones. I believe that it was a specimen of this last category which M. de Reinach, the government commissioner in Laos, sent to Paris, where it was valued at 7 francs per kilogram.

Since this specimen was sent we have sent two others for trial and evaluation to the business house Michelin et Cie., a large rubber manufacturer in Clermont-Ferrand.

The Superior Resident in Laos informs us that the Khua-nhut-niai, the liana which produces rubber, is found in all the thick forests along the banks of the Mekong. It grows in great numbers in the forests of the Bolovenes massif and on the sides of the great chain in the provinces of Saravane, Song-Khone and Cam-Muon. M. Tournier estimates that it can reproduce easily, [134] either by seeds or by cuttings. He believes it would also be easy to induce the natives in these regions to engage in the regular exploitation of the plant whenever they found a certain and remunerative market for the product.

To sum up the above observations, we have noted that Indo-China possesses at least two plant varieties which can yield rubber of excellent quality. These two varieties are the Parameria glandulifera in Cochinchina and the south of Cambodia, and an as yet undetermined species of Apocynaceae in Annam and Laos. Both the one and the other grow in such numbers that they hold forth hope of a veritable source of wealth for the colony. Up to the present time, only the lianas of the second variety have been exploited, and I should like to call attention to those of the first variety.

439 The customs statistics for exports from Tonkin for the whole of 1898 show that France received from this country 1,545 kilograms 314 of crude rubber with a value estimated at 2,020 francs, and that other countries received 619 kilograms with a value estimated at 947 francs, making a total of 2,164 kilograms with a value of 2,967 francs (1).

[505] (1) It should be noted that the greater part of this product leaves Vinh, in Annam, by coastal vessels, and that Hai-Phong is given as the port of embarcation on the Tonkin export lists.

For the first quarter alone of the current year, we find the following exports from Tonkin: to France, 13,623 kilograms with a value

314 439 of 40,869 francs; to Hong Kong warehouses, 1,271 kilograms with an estimated value of 2,458 francs; making a total of 14,894 kilograms valued at 43,227 francs.

Thus while the customs statistics for the years previous to 1898 do not even mention the export figures for this product, we find that the 1898 figure, which is a little more than two tons, has more than sextupled in the first quarter of the following year, which is the current one.

This amount of progress gives us every right to conceive real hopes for the future.

314 654 The general government of Indo-China (Department of Agriculture and Commerce) recently sent to the business house Michelin et Cie. (Clermont-Ferrand, and 7 Rue Gounod, Paris), for the purpose of analysis and evaluation, specimens of rubber which were collected in Laos through the offices of the superior resident.

According to the report of the superior resident in Laos, these specimens were produced by a liana, the Khua-nhut-niai of the Laotians, which is quite widespread in the thick forests on the banks of the Mekong and on the Bolovenes massif, as well as on the sides of the Annamitic Chain. One of the specimens submitted for analysis (No. 1) comes from a variety of rubber which is found particularly in Saravane. The other (No. 2) is the ordinary rubber harvested by the natives, with no further processing.

[135] An expert chemist sets forth in the following terms the results of the examination to which these specimens were subjected at the rubber factory of Michelin et Cie. at Clermont-Ferrand (August 5, 1899):

"The rubber in both boxes has the outer appearance of rubber from the Dutch East Indies of the kinds known in trading circles as 'Java,' 'Penang' or 'Preanger.' Like the latter, it probably comes from plants of the Ficus family. This presumable identity of origin is confirmed, moreover, by the characteristics of the isolated gum and resin of these specimens, as well as by the nature of the bark fragments which the specimens contained.

"We purified this rubber mechanically by the usual shredding processes. The thin leaves thereby obtained were dried in a drying-cabinet at a temperature of 25°-28° C.

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	No. 1 Saravane	No. 2
Weight of specimen	.608 kilog.	1.86 kilog.
Weight of purified gum	.58 kilog	1.54 kilog.
Yield of purified gum	95.39%	82.79%

Proximate analysis of the product yielded:

Moisture at 105°	1.06	1.4
Fixed ashes	1.3	1.4
Resins	3.4	9.76
Rubber	89.24	87.44

For comparison, the following is an analysis of Java rubber:

	Type 1[a]	Type 2[a]
Moisture	.75	
Ash	.8	1.3
Resins	4.48	7 to 9%
Rubber	93.97	
	100.00	

Indo-Chinese rubber, if in accordance with the specimens examined, would be likened on the market to Java type 2[a] rubber, which is graded and regulated as follows:

First quality Java rubber includes sound gums, without resinified parts (parts which have turned oily), of a fine light color, and without bark fragments.

Darker gums containing some fragments, but which are still sound on the whole are classified as second quality.

The third quality includes rubber which has been harvested with less care or in the wrong season, which has been poorly preserved, is more or less resinified and laden with foreign matter, ligneous debris, bark, sand, etc.

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The following figures, taken from the daily price lists on the markets of Antwerp, Hamburg, Liverpool and London, will give some idea of the commercial value of these types of rubber.

PRICE QUOTED ON "JAVA" OR "PENANG" ON THE VARIOUS EUROPEAN MARKETS

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Source	Date	Grade 1st	2d	3d
Hamburg	7-30-1899		6.95	
"	7-8	8.95	6.95	
"			7.55	
"	6-28		7.55	
London	6-1	8.98		
Antwerp	3-14			3.00
Amsterdam	4-10		7.59	
Antwerp	3-3			3.00
Le Havre	11-18-1898	8.40	5.85	
Hamburg	11-9	8.45	6.55	
"	11-2	8.55	5.55	
Antwerp	10-25			3.00
Hamburg	10-11	8.80	6.25	
"	9-9	8.80	6.25	
"	9-9	8.75	6.30	

(Bulletin économique de l'Indo-Chine. Report of the Director of the Indo-China Department of Agriculture and Commerce, October 1, 1899.)

II

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In August 1900 the Indo-China Department of Agriculture and Commerce sent to the Colonial Office, for purposes of analysis, specimens of rubber extracted from the bark of rubber lianas by simple grinding processes using native crushers and successive washings.

These specimens were prepared under the auspices of M. Gaillard, government commissioner in Khong. The crushed bark came from the liana called Khua-nhut-nhai which is found throughout all Laos.

The Colonial Office has published the results of the analysis of the specimens sent from Khong. The analysis was carried out under the direction of Dr. Heim, head of the Laboratory of the National Office for Foreign Trade [Office national du Commerce extérieur].

The following are the results of a comparison made between the rubber which was extracted from the liana Khua-nhut-nhai [137] by coagulation of the latex, according to this report, and the rubber extracted by grinding from the dry bark.

It is of particular interest to compare the rubber extracted from

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the liana by grinding the bark with that prepared by coagulation of the latex. The latter process probably includes spontaneous coagulation of the latex on the plant incisions, drawing the still soft gum into threads, and winding the gum threads into a ball immediately. We have been able to draw up this comparison thanks to a study previously made in the Laboratory of rubber from the Khua-nhut-nhai which was prepared in the same province of Khong from latex which was obtained by bleeding the plant.

The table below makes the comparison possible:

	Rubber extracted by grinding the dry bark. I	Rubber extracted by coagulation of the latex. II
Water	2.07%	1.8%
Inert matter	1.75	7.9
Resinous matter	1.05	4.9
Ashes	.32	.49
Water-soluble matter	1.14	1.7
Reducing agents	.19	.43
Nitrogenous matter	traces	traces
Rubber in the strict sense	93.5	82.78
Calculated losses in washing	4.94	11.4
Experimental losses in washing		12.2

This comparison lends itself to the following remarks:

The excess water noted in I may be attributed to the method of preparation itself, but it is too slight to cause any appreciable increase in the washing losses and, what is more, the very low hydration of II may be such as to facilitate its "turning oily" (if we accept the current and entirely empirical opinion of the experts).

The much higher losses in washing for II will lead I to be preferred, for the resiliency of I is at least equal to that of II, although II is quite noteworthy in this respect. The lower proportion of resinous matter in I again seems such as to give it the preference in this regard, yet the scope of this factor should not be exaggerated. I was analyzed as soon as received, whereas a lapse of time of about two to three months separated the date of the arrival of II in France and the date of the analysis, and as we know, time has a considerable influence on the resin content of all rubber.

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Having made these reservations, we are justified in concluding that I is a type of rubber which [138] is appreciably superior to II, although II deserves to be classified among the very good varieties of gum.

One last remark is, however, necessary. Before giving any final pronouncement as to the value of a type of rubber it is indispensable to subject it to the test of time, since its value is in direct proportion to its resistance to resinification. Under this heading I can nevertheless indicate already that rubber from the Khua-nhut-nhai (sample II) was subjected for three months to the worst kind of preservation conditions and that it withstood this trial admirably, not becoming subject to any resinification and not losing any of its elasticity.

There does not seem to be any doubt, moreover, but that the method of extracting rubber by grinding the bark gives a much higher yield of gum than can be obtained by the extraction method of bleeding the liana (assuming equal weights of fresh liana to be used in both cases).

I shall add, by way of indication, that according to the replies sent in answer to a questionnaire which was prepared under my direction at the request of a private corporation which exploits the rubber lianas of Laos, it appears to be a proven fact that cutting completely through the Khua-nhut-nhai lianas in no way compromises their vitality, on the express condition that the cutting be made above the level of the buds. Repeated bleedings of the same branch, on the other hand, yield an increasingly watery latex with an increasingly lower gum content.

The above information seems to me to be such that it might usefully be communicated to the agents of the administration, for it constitutes yet another argument in favor of exploiting the lianas exclusively by the method of grinding up the bark.

[113]

(Bulletin économique de l'Indo-Chine, January 1901, No. 31.)

III

It is of interest to note that the Superior Resident in Laos, following a long trip which he had just made between the Nam-Hou and the Mekong, remarked on the presence everywhere of numerous rubber lianas.

These lianas had not as yet been noted in the west. Colonel Tournier gave instructions for immediate exploitation to all the native chieftains who were not acquainted with the liana or its value.

654 What is more, according to the economic report for the months of February and March 1900 in Upper Laos, which has just reached the
• 314 Indo-China Department of Agriculture and Commerce, 3,250 kilo-
• 439 grams of rubber were exported during this period, or, to be precise,
435 this was the verified figure at Vien-Tiane. The storehouses in this center also contained a large supply which would probably go down-river at the first rises of the Mekong. [139] The sale price by natives at Vien-Tiane was said to be one piaster per kilogram.

Tran-ninh, which had not yet been able to supply any statistics, even approximate ones, indicated exports of 1,500 kilograms to Tonkin for the same period and at the same price as being the amount of export rubber which represented purchases from Vien-Tiane.

These prices, which are reasonable ones in view of the present value of money in Laos and the needs of the inhabitants, leaves the exporters sufficient profits. On the other hand, we have had occasion to note the entirely abnormal price of 5.50 francs per kilogram which rubber reached at Vinh towards the end of March 1900, a price which, when the cost of freight, transhipment and handling, insurance and losses in weight along the way is added, leaves only a small profit for the export trade.

IV

314 339,400 kilograms of rubber were exported from Indo-China
439 during 1900, as against 52,813 in 1899. Of this amount, 300,400 kilograms went out through Tonkin, and 39,000 kilograms through Saigon. The greater part of this rubber comes from Annam, and especially from Tran-Ninh (Laos).

By these figures we see how greatly the rubber trade has grown in Indo-China, and what a factor this raw material promises to be in the economic development of the colony.

The sale price in 1899 was one piaster per kilogram. Since that time it has risen appreciably in consequence of a rising demand from all quarters. In the province of Vien-Tiane the average price is two piasters per kilogram, and in the forests where the rubber is grown it costs 90 piasters per picul.

314 The rapid rise in the price of rubber has encouraged the natives to engage in excessive exploitation of the product, and without any care for the future they have destroyed large quantities of extremely productive lianas. The Laotians do not know how to collect the sap of the rubber plant and still spare the plant itself, and they thereby

314 lose forever the plant which they have mutilated. The Superior Resident in Laos has had studies made of the methods of extraction which can be employed without danger, and he proposes to make them obligatory within a short time. As of the present time, he has issued the following decree relative to the exploitation of rubber:

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"Any native desiring to engage in harvesting rubber on Laotian territory must obtain a special authorization which will be conferred by the chau-muong if the interested party resides in the muong where he desires to operate, and in all other cases by the Government Commissioner of the province.

[65] [410] "This authorization shall indicate, in as clear a manner as possible, the limits within which exploitation is to take place, the methods of extraction which may be employed and those which are prohibited, and finally the point where the rubber must be submitted for checking and payment of the duties which represent land tax before it leaves Laos.

"Businessmen and corporations desirous of sending their paid agents into the regions of rubber production may address to the Government Commissioner a collective request, in which the names and residences of such agents shall be listed and in which they shall agree to abide by all regulations which the authorities shall deem it useful to prescribe. In return they shall be sent permits drawn up in accordance with the provisions of the preceding article, these permits to be delivered to their employees.

"The above authorizations shall be granted entirely free of charge.

"Contraventions to the present decree shall be prosecuted and punished by the provincial tribunals in accordance with the laws and customs in force in Laos." (Decree of September 21, 1900.)

[141]

APPENDIX XXIII
NOTE ON TOBACCO

249 Growth and preparation. Tobacco is best grown on the banks of watercourses which are left dry each year when the waters fall and which are fertilized by deposits of alluvia.

Tobacco is also grown, however, on the banks in old alluvia which are no longer inundated by the river, but where an ample supply of water is assured by the presence of a nearby stream.

134 In Laos the soil which is suited to tobacco is light and sandy and
249 contains a high proportion of potash, relatively little lime and an average quantity of nitrogenous vegetable matter.